

The base of the Silurian System in Tasmania

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Synopsis

The base of the Silurian System in Tasmania lies within the Westfield Sandstone, probably just below an horizon exposed in the road cutting immediately east of Westfield Quarry and containing a rich fauna including ?*Akidograptus*, *Atavograptus*, *Climacograptus normalis* and *Glyptograptus persculptus*.

Introduction

The base of the Silurian System in Tasmania lies within the uppermost formation of the Gordon Group, the Westfield Sandstone (this includes the Westfield Beds of Corbett & Banks 1974 and equals the Arndell Sandstone of Baillie 1979). The Gordon Group is a predominantly shallow water sequence, deposition of which began in the Canadian and continued apparently without interruption into the early Silurian. Within this group in the Florentine Valley (lat. 42° 37' S, long. 146° 22' E) the uppermost carbonate formation, the Benjamin Limestone, is overlain by the Westfield Sandstone. Stratigraphically equivalent limestones are overlain by siltstones and/or sandstones in the Linda Valley in western Tasmania and Mole Creek in northern Tasmania, but only in the Florentine Valley are the sequences sufficiently exposed, structurally simple enough and known well enough for consideration in the context of this volume.

The relevant sections in the Florentine Valley lie within the Westfield Syncline and the Tiger Syncline of the Florentine Synclinorium (Corbett & Banks 1974). These structures in the relevant areas appear to be simple and most of the dips lie between 30° and 50° (Fig. 1). The two areas of particular importance are the Westfield Syncline and the eastern flank of the Tiger Syncline.

Biostratigraphy

In the Westfield Syncline the top of the Benjamin Limestone, e.g. at Corbett & Banks (1974) locality 13, contains stromatoporoids (Webby & Banks 1976), rugose corals including *Foerstephyllum* sp., *Palaeophyllum* spp., *Favistina* sp., *Cyathophylloides* sp., favositids including *Palaeofavosites* sp., auloporids including *Eofletcheria* sp., heliolitids including *Calapoecia* sp. and *Coccoseris*, halysitids including *Catenipora* sp. and *Falsicatenipora* cf. *chillagoensis* (Etheridge), ?*Beloitoceras* sp., *Dinorthis* sp. (Laurie 1982) and the conodonts *Belodina compressa* and *Phragmodus undatus* (Banks & Burrett 1980). The assemblage suggests correlation with the *P. linearis* Zone (Webby *et al.* 1981) and is clearly Ordovician.

No contact between the Benjamin Limestone and the Westfield Sandstone is exposed. Localities F1 of Baillie & Clarke (1976) and C.&B.15 of Corbett & Banks (1974) are clearly close to the base of the Sandstone. F1 and F9 of Baillie & Clarke (1976) are closely similar faunally (see Table 1) as are GB15 and GB16 of Corbett & Banks (1974), and differences between F1 and F9 on the one hand and C.&B.15 and 16 on the other may be ecological rather than temporal since F1 and F9 are in sandstone and the other two in siltstone. The fauna from F3 of Baillie & Clarke (1976) is similar to that of C.&B.15 and 16 and is also in siltstone. All five localities can conveniently be grouped together as different from other and higher horizons. *Glossograptus* sp. and a trinucleid related to *Guandacolithus* suggest that these horizons are late Ordovician. A few metres stratigraphically above F1 is an horizon, L6 of Laurie (1982), containing *Hirnantia* sp. and *Isorthis (Ovalella)* n. sp. (Laurie 1982). A further 40 m stratigraphically higher is a richly fossiliferous horizon (C.&B.18, B.&C.F2, L11) with *Onniella* sp., *Eospirifer* sp., and other brachiopods, *Pterinea* sp., *Orthodesma* sp., *Encrinuraspis* sp., *Brongniartella* sp., *Eokosovopeltis* sp.,

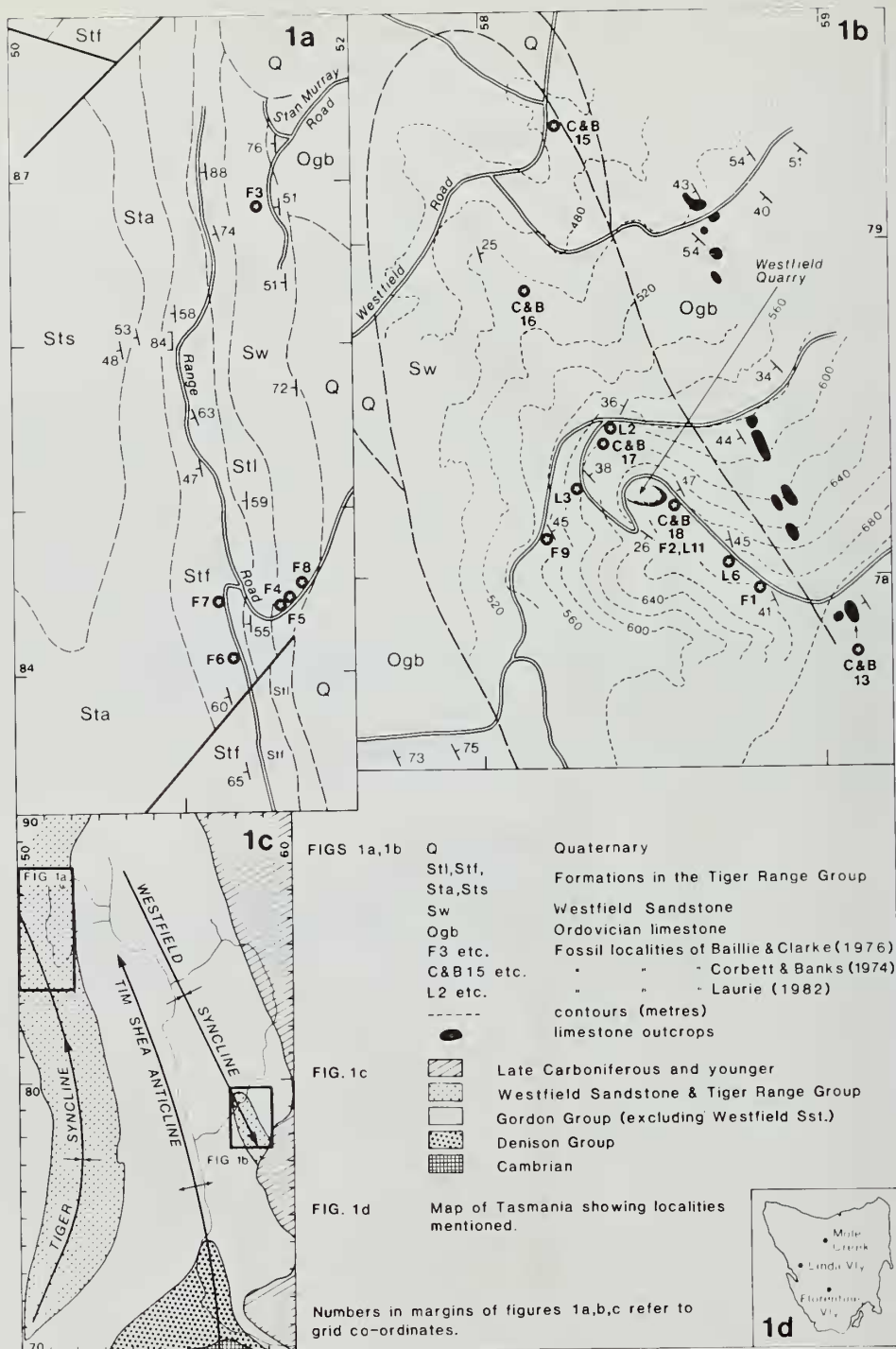


Fig. 1 Ordovician-Silurian Boundary outcrops in Tasmania. 1a, The Tiger Syncline; 1b, The Westfield Syncline; 1c, The Florentine Valley, also showing the positions of Figs 1a and 1b; 1d, The Florentine and Linda Valleys and Mole Creek within Tasmania.

Table 1 Biostratigraphical range chart of fossils from the Westfield Sandstone, Tasmania.

Taxon	CB15	F3	F9	F1	L2	L3	L6	F4	CB16	CB18		
										F2 L11	F8	F5
<i>Lepidocyclus</i>	x	—	x	x	—	—	—	—	—	?	—	—
** <i>Pterinea</i> sp. A P.&G.-T.	x	—	—	—	—	—	—	—	—	—	—	—
<i>Onniella</i>	x	—	x	x	—	—	—	x	—	x	x	—
*? <i>Onniella</i> n. sp. L.	—	—	—	—	—	—	—	—	—	x	—	—
cf. <i>Calymene birmanicus</i>	x	—	—	—	—	—	—	—	x	?	—	—
cf. <i>Guandacolithus</i>	x	x	—	—	—	—	—	—	x	?	—	—
cf. <i>Heterorthis</i>	—	x	—	—	—	—	—	—	—	—	—	—
<i>Byssococonchia</i>	—	x	—	—	—	—	—	—	—	—	—	—
<i>Bumastus</i>	—	x	—	—	—	—	—	—	x	—	—	—
<i>Flexicalymene</i>	—	x	—	—	—	—	—	—	—	—	—	—
? <i>Dalmanophyllum</i>	—	—	x	x	—	—	—	—	—	—	—	—
? <i>Holophragma</i>	—	—	x	x	—	—	—	—	—	—	—	—
<i>Dolerorthis</i>	—	—	x	x	—	—	—	—	—	—	—	—
<i>Kjerulfina</i>	—	—	x	—	—	—	—	—	—	x	—	—
* <i>Hirnantia</i> n. sp. L.	—	—	—	—	x	x	x	—	—	—	—	—
* <i>Isorthis (Ovalella)</i> n. sp. L.	—	—	—	—	—	—	x	—	—	—	—	—
* <i>Kinnella</i> cf. <i>kielanae</i> T.S.	—	—	—	—	—	x	—	—	—	—	—	—
<i>Bekkeromena</i>	—	—	—	—	—	—	—	x	—	x	x	—
<i>Hedstroemina</i>	—	—	—	—	—	—	—	x	—	x	x	—
<i>Orthodesma</i>	—	—	—	—	—	—	—	—	x	x	—	—
<i>Pterinea</i>	—	—	—	—	—	—	—	—	x	x	—	—
** <i>Tasmanocoenularia</i> sp. Parfrey	—	—	—	—	—	—	—	—	x	—	—	—
<i>Glossograptus</i>	—	—	—	—	—	—	—	—	x	—	—	—
retiolitid	—	—	—	—	—	—	—	—	x	—	—	—
favositids	—	—	—	—	—	—	—	—	—	x	—	—
** <i>Eospirifer</i> sp. S.&B.	—	—	—	—	—	—	—	—	—	x	—	—
<i>Brongniartella</i>	—	—	—	—	—	—	—	—	—	x	—	—
<i>Bumastoides</i>	—	—	—	—	—	—	—	—	—	x	—	—
<i>Encrinuraspis</i>	—	—	—	—	—	—	—	—	—	x	—	—
<i>Encrinurus</i>	—	—	—	—	—	—	—	—	—	x	—	—
<i>Eokosovopeltis</i>	—	—	—	—	—	—	—	—	—	x	—	—
<i>Gravicalymene</i>	—	—	—	—	—	—	—	—	—	x	—	—
**? <i>Akidograptus</i> B.B.&R.	—	—	—	—	—	—	—	—	—	x	—	—
** <i>Atavograptus</i> B.B.&R.	—	—	—	—	—	—	—	—	—	x	—	—
** <i>Climacograptus normalis</i> Lapworth	—	—	—	—	—	—	—	—	—	x	—	—
** <i>Glyptograptus persculptus</i>	—	—	—	—	—	—	—	—	—	x	—	—
** <i>Glyptograptus</i> cf. <i>persculptus</i>	—	—	—	—	—	—	—	—	—	x	—	—
** <i>Eospirifer tasmaniensis</i> S.&B.	—	—	—	—	—	—	—	—	—	—	—	x

**Indicates published description and/or figure.

*Indicates figured and described in a Ph.D. thesis (Laurie 1982).

Other taxa names based on preliminary to somewhat detailed examination.

Records from Baillie (1979); Baillie, Banks & Rickards (1978); Baillie & Clarke (1976); Banks & Burrett (1980); Corbett & Banks (1974); Laurie (1982); Parfrey (1982); Pojeta & Gilbert-Tomlinson (1977); Sheehan & Baillie (1981); Webby & Banks (1976).

Bumastoides sp., *Gravicalymene* sp., ?*Akidograptus* sp., *Atavograptus* sp., *Climacograptus normalis* Lapworth, *Glyptograptus persculptus* (Salter) and *G. cf. persculptus*. The graptolites suggest either the *persculptus* Zone or an horizon low in the *acuminatus* Zone (Baillie *et al.* 1978). In view of the recent decision to place the base of the Silurian System at the base of the *acuminatus* Zone (Cocks 1985), this horizon must lie close to the base of the System.

Horizons (L2, L3 of Laurie) contain *Hirnantia* sp. and one of these also contains *Kinnella* cf. *kielanae* (Laurie 1982). The stratigraphical positions of these horizons are not clear and one

or both could be stratigraphically below F2 (both are some tens of metres topographically lower).

The brachiopods *Bekkeromena* sp., *Hedstroemina* sp. and *Onniella* sp. have been collected from an horizon (F4 of Baillie & Clarke 1976) on the eastern flank of the Tiger Syncline. A slightly higher horizon (F5 of Baillie & Clarke) on the flank of the Tiger Range contains *Eospirifer tasmaniensis* Sheehan & Baillie (1981) in abundance. This occurs 65 m below the top of the Westfield Sandstone which is overlain by the Gell Quartzite and then the Richea Siltstone of the Tiger Range Group (Baillie 1979). The Richea Siltstone contains graptolites in an horizon 300 m above that with *E. tasmaniensis* and the graptolites indicate a very late Llandovery age (Baillie 1979).

References

- Baillie, P. W. 1979. Stratigraphic relationships of Late Ordovician to Early Devonian rocks in the Huntley Quadrangle, south-western Tasmania. *Pap. Proc. R. Soc. Tasm.*, Hobart, **113**: 5–13.
- , Banks, M. R. & Rickards, R. B. 1978. Early Silurian graptolites from Tasmania and their significance. *Search*, Sydney, **9** (1–2): 46–47.
- & Clarke, M. J. (1976). Preliminary comments on Early Palaeozoic (Late Ordovician–Early Silurian) rocks and fossils in the Huntley Quadrangle. Tasmania Dept Mines Unpub. Rept. 1976/41.
- Banks, M. R. & Burrett, C. F. 1980. A preliminary Ordovician biostratigraphy of Tasmania. *J. geol. Soc. Aust.*, Adelaide, **26**: 363–376.
- Cocks, L. R. M. 1985. The Ordovician–Silurian Boundary. *Episodes*, Ottawa, **8**: 98–100.
- Corbett, K. D. & Banks, M. R. 1974. Ordovician stratigraphy of the Florentine Synclinorium, southwest Tasmania. *Pap. Proc. R. Soc. Tasm.*, Hobart, **107**: 207–238.
- Laurie, J. R. (1982). The taxonomy and biostratigraphy of the Ordovician and Early Silurian articulate brachiopods of Tasmania. Ph.D. thesis, Univ. Tasmania (unpublished).
- Parfrey, S. M. 1982. Palaeozoic conulariids from Tasmania. *Alcheringa*, Adelaide, **6**: 69–77.
- Pojeta, J. & Gilbert-Tomlinson, J. 1977. Australian Ordovician pelecypod molluscs. *Bull. Bur. Miner. Resour. Geol. Geophys. Aust.*, Melbourne, **174**: 1–64.
- Sheehan, P. M. & Baillie, P. W. 1981. A new species of *Eospirifer* from Tasmania. *J. Paleont.*, Tulsa, **55**: 248–256, pl. 1.
- Webby, B. D. & Banks, M. R. 1976. *Clathrodictyon* and *Ecclimadictyon* (Stromatoporoidea) from the Ordovician of Tasmania. *Pap. Proc. R. Soc. Tasm.*, Hobart, **110**: 129–137.
- , VandenBerg, A. H. M., Cooper, R. A., Banks, M. R., Burrett, C. F., Henderson, R. A., Clarkson, P. D., Hughes, C. P., Laurie, J., Stait, B., Thomson, M. R. A. & Webers, G. F. 1981. *The Ordovician System in Australia, New Zealand and Antarctica. Correlation chart and explanatory notes*. 64 pp., 4 figs, 2 charts. Paris & Ottawa (Int. Union Geol. Sci. Publ. 6).